

CLAIMS

1. A method for operating a radiotelephone system, the method comprising:

5 at a first mobile station, requesting communication with a second mobile station; and
at a base station serving the first mobile station, if radio propagation conditions between the first mobile station and the second mobile station are sufficiently good, instructing the first mobile station and
10 the second mobile station to establish direct communication.

2. The method of claim 1 wherein requesting communication comprises:

15 communication information about the radio propagations conditions between the first mobile station and the second mobile station to the base station.

3. The method of claim 1 wherein instructing the first mobile station and the second mobile station to establish direct communication comprises:

20 establishing independent radio links with the first mobile station and the second mobile station;
transmitting a direct communication instruction to the first mobile station and the second mobile station; and
terminating the independent radio links.

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4. The method of claim 1 further comprising:

at the first mobile station, determining the radio propagation conditions between the first mobile station and the second mobile station;
communicating information about the radio propagation conditions to the
30 base station; and

updating the information about the radio propagation conditions.

5. A method for operating a radiotelephone system, the method comprising:

5 at one or more mobile stations of the radiotelephone system, detecting
other mobile stations to which radio propagation conditions are
sufficiently good;
at the one or more mobile stations, communicating information about the
detected mobile stations to a base station of the radiotelephone
10 system;
at a first mobile station, requesting communication with a second mobile
station; and
at the base station, if the radio propagation conditions between the first
mobile station and the second mobile station are sufficiently good,
15 instructing the first mobile station and the second mobile station to
establish direct communication.

6. The method of claim 5 further comprising:

20 at the base station, receiving the communication request from the first
mobile station; and
from the information about the detected mobiles from the first mobile
station and the second mobile station, determining if the first mobile
station and the second mobile station may initiate direct
communication.

25 7. The method of claim 4 further comprising:

determining if each of the first mobile station and the second mobile station
is a detected mobile of the other mobile station.

30 8. The method of claim 6 further comprising:

at the base station, determining a location of the first mobile station;

determining a location of the second mobile station; and
determining information about relative proximity of the first mobile station
and the second mobile station based on the location of the first
mobile station and the location of the second mobile station.

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9. The method of claim 5 wherein instructing the first mobile station
and the second mobile station to establish direct communication comprises:

initiating a first communication link between the base station and the first
mobile station;

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communicating a direct communication instruction to the first mobile
station;

initiating a second communication link between the base station and the
second mobile station;

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communicating a direct communication instruction to the second mobile
station;

terminating the first communication link and the second communication
link.

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10. The method of claim 5 wherein detecting other mobile stations
comprises:

detecting respective uplink transmissions from respective mobile stations to
base stations of the radiotelephone system.

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11. The method of claim 10 further comprising:

determining a received signal strength for a detected uplink transmission
from a detected mobile station;

if the received signal strength exceeds a threshold, identifying the detected
mobile station as a possible relay candidate.

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12. The method of claim 5 further comprising:

at the first mobile station, in response to the instruction establish direct communication, entering a packet-based connectionless communication mode with the second mobile station.

5 13. The method of claim 12 wherein packet-based connectionless communication mode comprises entering an Opportunity Driven Multiple Access relay mode.

10 14. A method for operating a base station in a radiotelephone system, the method comprising:
receiving a request from a first mobile station to initiate a call with a second mobile station in the radiotelephone system;
based at least in part on a relay candidate list associated with the first mobile station, determining if the second mobile station is
15 physically close to the first mobile station; and
if so, instructing the first mobile station and the second mobile station to enter a relay mode for direct link communication.

20 15. The method of claim 14 wherein instructing the first mobile station and the second mobile station to enter a relay mode comprises:
communicating information about the relay mode a over a first link with the first mobile station;
communicating information about the relay mode a over a second link with the second mobile station; and
25 terminating both the first link and the second link.

30 16. The method of claim 14 further comprising:
receiving from respective mobile stations of the radiotelephone system information about relay candidates of the respective mobile stations;
storing the information in respective relay candidate lists; and

receiving updates from the respective mobile stations for updating the
respective relay candidate lists.

17. A radiotelephone comprising:

a radio communication circuit configured for two-way radio
communication with remote radio devices; and

a controller configured to control the radio communication circuit to
establish a radio link to a remote base station to convey a request for
communication with another radiotelephone and to receive over the
radio link a direct communication instruction, and further
configured to control the radio communication circuit to interrupt
the radio link and establish a relay radio link with the other
radiotelephone in response to the direct communication instruction.

18. The radiotelephone of claim 17 further comprising:

a memory configured to store a relay candidate list,
the controller being further configured to control the radio communication circuit
to establish a radio link to the remote base station to convey the relay candidate
list to the remote base station.

19. The radiotelephone of claim 18 wherein the controller is further
configured to control the radio communication circuit to detect radio transmissions
from other radiotelephones and, in response to the detected uplink transmissions,
to populate the relay candidate list.